

CLAIMS

1. A fuel cell comprising:

a cell plate provided with:

a supporting body, and

5 a. cell formed on the supporting body, the cell including a solid electrolyte layer, a cathode substance layer formed on one surface of the solid electrolyte layer, and an anode substance layer formed on the other surface of the solid electrolyte;

an electroconductive gas separator which cooperates with the cell plate, to form a gas passage; and

10 a holder member holding a part of the cell plate.

2. The fuel cell of claim 1, wherein the holder member further holds a part of the gas separator.

3. The fuel cell of claim 1, wherein the cell plate, gas separator and holder member constitute a cell unit, and each cell unit is stacked in a stacking direction and mutually electrically connected one another to thereby constitute a stack.

15 4. The fuel cell of claim 3, wherein a fastening force is applied to a portion within the holder member of each unit cell of the stack, as a main portion to which the fastening force is applied.

5. The fuel cell of claim 4, wherein a compressive force, in the stacking direction, due to the fastening force is applied at least to the cell plate and the electroconductive gas separator of each unit cell of the stack.

20 6. The fuel cell of claim 1, wherein a gas-impermeable metal member is provided to neighbor to the supporting body, and that portion of the cell unit which corresponds to the gas-impermeable metal member is held by the holder member.

7. The fuel cell of claim 6, wherein an insulating member is provided on the metal member, and the metal member and the insulating member respectively have the same thermal expansion
25 coefficients as that of the solid electrolyte layer.

8. The fuel cell of claim 1, wherein the holder member is provided with a gas supplying passage supplying a gas to the gas passage.

9. The fuel cell of claim 1, wherein the gas separator is provided to oppose to one side of the cell plate so as to form the gas passage while closing an outer peripheral side of the gas passage,

30 and wherein the holder member is provided with a gas supplying passage supplying a gas to

the gas passage and with a gas exhausting passage exhausting the gas from the gas passage, so that a first gas is supplied from the gas supplying passage to the gas passage and a second gas is supplied to the other side of the cell plate.

10. The fuel cell of claim 1, wherein the gas separator is provided to oppose to one side of the cell plate so as to form the gas passage while opening an outer peripheral side of the gas passage,

and wherein the holder member is provided with a gas supplying passage supplying a gas to the gas passage, so that a first gas is supplied from the gas supplying passage to the gas passage and exhausted from the outer peripheral side of the gas passage and a second gas is supplied to the other side of the cell plate.

11. The fuel cell of claim 1, wherein the gas separator is provided to oppose to one side of the cell plate so as to form a first gas passage while opening an outer peripheral side of the first gas passage,

wherein the cell plate of the cell unit cooperates with a gas separator of a neighboring cell unit to thereby form a second gas passage therebetween while opening an outer peripheral side of the second gas passage,

and wherein the holder member is provided with a first gas supplying passage supplying a first gas to the first gas passage and with a second gas supplying passage supplying a second gas to the second gas passage, so that the first gas is supplied to the first gas passage through the first gas supplying passage and is exhausted from the outer peripheral side of the first gas passage, and the second gas is supplied to the second gas passage through the second gas supplying passage and exhausted from the outer peripheral side of the second gas passage.

12. The fuel cell of claim 1, wherein the gas separator comprises a first gas separator and a second gas separator provided to oppose to one side and the other side of the cell plate so as to form a first gas passage and a second gas passage, respectively, while opening an outer peripheral side of the first gas passage and an outer peripheral side of the second gas passage,

and wherein the holder member is provided with a first gas supplying passage supplying a first gas to the first gas passage and with a second gas supplying passage supplying a second gas to the second gas passage, so that the first gas is supplied to the first gas passage through the first gas supplying passage and is exhausted from the outer peripheral side of the first gas passage,

and the second gas is supplied to the second gas passage through the second gas supplying passage and exhausted from the outer peripheral side of the second gas passage.

13. The fuel cell of claim 1, wherein the holder member includes a first member arranged at one side of the cell plate and having electroconductivity, a second member arranged at the other side of the cell plate and having electroconductivity, and an electrically insulative material joining the first member to the second member.

14. The fuel cell of claim 3, wherein the gas separator is provided at one side of the cell plate, the holder member is made of an electrically insulative material, and an electric conductor is provided between the neighboring cell units so as to electrically connect the neighboring cell units to each other.

15. The fuel cell of claim 3, wherein the gas separator is provided at each of one side and the other side of the cell plate, the holder member is made of an electrically insulative material, and the gas separator of the cell unit is mutually electrically connected to the gas separator of a neighboring cell unit.

16. The fuel cell of claim 1, wherein the holder member and the gas separator are made of the same material and are joined to each other by diffusion bonding.

17. The fuel cell of claim 1, mutual contacting areas of the holder member, gas separator and cell plate are formed into mirror surfaces, respectively.

18. The fuel cell of claim 1, wherein mutual contacting areas of the holder member, gas separator and cell plate are formed with thin films, respectively, having a low hardness and a low electrical resistance.

19. The fuel cell of claim 3, wherein the stack is elastically held within a casing.

20. The fuel cell of claim 1, wherein the holder member is arranged in a hole provided at a central portion of the cell plate.

21. The fuel cell of claim 1, wherein the holder member and cell plate have circular or polygonal outer shapes, respectively.